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Sustaining Universal Service Conditions in Smart Electricity Systems

Lea Diestelmeier*, Dirk Kuiken**

Abstract - This article analyses how the transition towards Smart Electricity Systems (SES) influences the household customers' right to access the electricity system under EU law, and gives recommendations on how to sustain this right in the SES scenario.

Introduction

One of the EU policy goals guiding the evolution of electricity systems is to facilitate smart electricity systems (SES). SES enable increased interaction of various actors in the electricity sector through information and communication technology (ICT) infrastructure. The goal of this increased level of interaction is to improve energy efficiency, competition, and the efficient integration of renewable energy sources (RES).

Also household consumers are envisaged to interact and actively participate in the SES by reacting upon real-time information on electricity generation and supply. However, in order to be able to do so, household consumers need access to the relevant communication system and the subsequent services. This implies only if household consumers can access those communication systems and services, they can enjoy electricity supply at universal service conditions, which is "*the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable, transparent and non-discriminatory prices*" (article 3(3) Directive 2009/72/EC).

Maintaining this provision in the context of SES inevitably poses the question whether similar conditions need to be included for household consumers accessing the SES' ICT infrastructures. Access to communication systems can be covered by various technologies with different qualities and access conditions. This article briefly points out the differences between the electricity- and the telecommunication access rights for household consumers, and argues that those differences result in ambiguities with regard to conditions for household consumers accessing SES. Thereafter, this article analyses the conditions upon which household consumers should have access to SES,

and whether these conditions can be safeguarded by the current EU legal framework. Finally, this article provides conclusions and recommendations for (national) policy makers on how to safeguard the minimum conditions required for household consumers to access SES.

Smart Electricity Systems

In the transition towards a more sustainable and efficient energy system, SES are said to be essential (EU Commission 2011: 10). Various objectives and functionalities are ascribed to SES, which can be translated into technical minimum requirements. This section broadly identifies the ascribed objectives and functionalities and resulting technical requirements.

Policy Objectives

Determining the objectives, article 2(7) of the Regulation on Trans-European energy infrastructures (Regulation (EU) 347/2013) offers a starting point by establishing the following definition of smart grids (electricity systems): "*smart grid* means an electricity network that can integrate in a cost efficient manner the behaviour and actions of all users connected to it, including generators, consumers and those that both generate and consume, in order to ensure an economically efficient and sustainable power system with low losses and high levels of quality, security of supply and safety". In addition to this definition, the Regulation provides some indication on SES functionalities by specifying the criteria for smart grids as Projects of Common Interest (article 4(2c) Regulation (EU) 347/2013). On the basis of this, the following four main objectives that a SES should fulfil are identified: maintaining grid resilience, improving energy efficiency, integra-

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ting RES, and involving system users.

The focus in this article is on the objectives to involve system users (including household consumers). The aim of interaction between system users is increasing flexibility of consumption and generation, which becomes crucial with regard to RES and energy efficiency goals. This requires a constant information exchange between all connected system users in order to act and react close to real-time upon supply and demand.

Technical Requirements

Realising the interaction between system users requires the transmission and processing of data and therefore communication infrastructure. Communication systems are defined as: “[...] *transmission systems [...] which permit the conveyance of signals by wire, radio, optical or other electromagnetic means [...] irrespective of the type of information conveyed*” (article 2(a) Directive 2002/21/EC). This definition already implies that many different communication technologies exist. All different technologies have their own characteristics. The current electricity system is enhanced with communication systems for monitoring and controlling (Aiello and Pagani 2016: 14). With regard to the SES ICT infrastructure, not just one type of technology (communication system) is used for SES. Dependent on the exact purposes (e.g. advanced (smart) metering, or demand response) and technical criteria of the SES, a complex web of interconnected communication systems with varying technical specifications will be deployed (Sato et al. 2015: 247 – 250). Hence, the following main types of communication systems can be used for SES: 1) the home area networks (HANs), most likely including a communication service that is used for accessing the internet, 2) communication systems exclusively dedicated to smart meter communications, and 3) other communication systems used by system operators.

The SES involves the electricity system and communication systems. Different types of communication systems can facilitate the access to SES. This also means that household consumers could have different options for accessing SES.

SES Access Conditions in EU Law

As mentioned above, SES are considered as a prominent and cost-efficient solution for ensuring the affordability of the future electricity system (European Commission 2015). Hence, in order to reap the benefits of SES, customers need access to the SES, inter alia the relevant

communication systems (European Commission 2015 and CEN-CENELEC-ETSI 2012: 14). EU law regulates both, the access conditions for the electricity system and for (tele)communication systems. In order to understand the access conditions for SES, both access conditions have to be taken into consideration, and perhaps even more importantly, the differences between both access regimes in SES.

The goal of both access regimes is to provide a level playing field for system users and to protect (household) consumers. Yet, significant differences in technology and circumstances between electricity- and communication systems exist. The most prominent difference is the availability of parallel infrastructures and/or alternative technologies. Whereas only one electricity grid exists, various communication systems are in place. Dependent on the technology used in communication systems, the systems can be used for comparable purposes. This difference in alternative technologies and parallel networks is also reflected in both access regimes.

The access conditions for the electricity system are much more absolute than the access conditions for communication systems. The most important difference is that the Electricity Directive poses a public service obligation for both the supply of electricity (article 3(3) Directive 2009/72/EC) and consequently access to the electricity system (ECJ Case 239-07: par. 40 – 41, 48). Access to the electricity system is the right to use the electricity system (ECJ Case 239-07: par. 42), which should be provided to all system users (including customers) without discriminating between system users (article 32(1) Directive 2009/72/EC and Kruimer 2011: 274.). Given the fact that access is used as a vehicle for providing electricity supply at universal service conditions, “*that is the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable, transparent and non-discriminatory prices*”, to household customers (article 3(3) Directive 2009/72/EC), the access conditions for electricity systems should also ensure such universal service conditions.

In contrast to the access regime of the electricity system, in the EU telecommunications access regime, consumers do not have direct right to access communication systems. Only service providers access the communication system, consumers are seeking access to communication services. In general, three different types of communication services can be identified in EU law, each implying different conditions and rights for consumers to access the service (Nihoul and Rodford 2011: 301):

1. (public) communication services, to which general

consumer protection applies. Examples of such protection are: minimum contract terms, information requirements for service providers, and switching (from one service provider to another) provisions (articles 20 – 30 Directive 2002/22/EC);

2. universal services, to be provided to all consumers at specified quality levels and affordable prices (article 3(1) Directive 2002/22/EC). For SES, the most relevant of these services is the data communication service “*at data rates that are sufficient to permit functional internet access*” (article 4(2) Directive 2002/22/EC);

3. services of general interest, which are set at Member State (MS) level. Although such services distort the level playing field, MSs can request for an exemption to the prohibition to provide special rights and duties to specific undertakings in order to appoint specific companies with a right to provide services of general interest (article 106(2) Treaty on the Functioning of the European Union).

Although the above access conditions could well guarantee access to communication services that are suitable for SES purposes on MS level, from a EU law perspective such a guarantee does not exist. Firstly, EU law does not require (public) communication services, suitable for SES purposes, to be of a specified quality and at an affordable price. Secondly, no universal service exists that de facto guarantees suitability to be used for SES purposes. Although functional internet access should be guaranteed by the MSs, the MSs have the discretion to decide what is considered as ‘functional internet access’ and for what purposes. The European Commission already acknowledged that the current universal service conditions for data connections are not up to standards anymore for the modern data connection requirements (European Commission 2010: 21, and Batura 2016: 239). Nevertheless, in practice it seems plausible that the minimum data rates or latency requirements for such a universal service on MS level might be suitable for SES purposes (e.g. ADSL connections might be suitable, Sato et al. 2015: 267). Thirdly, MSs could opt for a service of general interest, assuming MSs can rely on justifiable reasons for granting special or exclusive rights to certain undertakings. Yet, although this seems like a suitable alternative if no other services able to meet SES communication standards are available, EU law does not guarantee the availability of such services.

Access Options and Regulatory Conditions

Key for the functioning of SES and for household consumers to participate and benefit therein is access to informa-

tion in a specified time interval through communication services. Household consumers who do not have access to SES communication services at a reasonable price and therefore cannot participate in the SES at a reasonable price, might pay unreasonably higher electricity prices compared to consumers who are able to participate at a reasonable price (most likely the benefits for those that interact in the SES are paid by those who do not interact). Thus, ensuring the effective right for household consumers to be supplied with electricity at universal service conditions depends on the access conditions for communication services. From the current rules on accessing communication services four potential access options can be identified, each revealing different regulatory guarantees for household consumers to access SES communication services.

Option 1: Data Connection under Universal Service Conditions

MSs have to ensure the availability of ‘functional internet access’ to all users, geographically independent, and at an affordable price (article 3 and 4(2) Directive 2002/22/EC). Possibly, ‘functional internet access’ could also be of sufficient quality for SES communication services. Yet, this is no guarantee as the provision leaves much discretion to the MSs and does not include any quality specifications required for SES purposes.

Option 2: Smart Meter Communication Infrastructure

In case the implementation of smart meters is assessed to be economically viable in a MS, at least 80% of the final customers should be provided with smart meters (Annex I(2) Directive 2009/72/EC). However, this does not guarantee access to SES communication services nor is the reading frequency of such a smart meter guaranteed to be in line with the quality requirements of the SES. Although the Electricity and Energy Efficiency Directives mention certain frequency requirements, such as measuring the actual time of use, and the requirement to produce data “*frequently enough to enable [consumers] to regulate their own electricity consumption*”, the MSs have large discretionary powers in defining such quality standards (article 9 and 10(2) Directive 2012/27/EU and Annex I(2) Directive 2009/72/EC and Hierzinger et al. 2012), technical reports of the European Standardisation Organisations plead that effective demand-response requires 15 minutes, up to real-time information. So, not only is the access to SES communication services not guaranteed, but also the quality standards are contested.

Option 3: Service of General Interest

MSs may choose to ensure access of a certain quality to SES, by classifying it as service of general interest to be provided by one or several designated entities. However,

MSs are restricted by EU law in providing ‘special and exclusive’ rights, and in principle, services of general interest should only be required if market parties are unable to provide for the services and the service is considered to be of ‘general economic interest’ (article 106 Treaty on the Functioning of the European Union). Nevertheless, if services of general interest should be provided, possibly the distribution- or transmission system operator (DSO, TSO) could be designated as the responsible party.

Option 4: Market Alternatives

Alternatively, market parties can offer communication services meeting the SES quality requirements to household consumers. Yet, such communication services are not subject to the requirement of providing all consumers with a service under equal conditions. Therefore, a reasonable price applicable to all household consumers for these services cannot be guaranteed in the market realm. This might be troublesome for ensuring the universal service rights related to accessing SES (article 3(3) Directive 2009/72/EC).

Conclusions and Recommendations

The changing electricity system towards SES implies that access for household consumers to SES includes access to systems and services for the purpose of the transmission of electricity with a view to efficiency gains on the basis of real-time information on generation and consumption. Therefore, MSs have to ensure access to SES communication services for guaranteeing the universal service conditions of electricity supply for household customers. The current EU rules on accessing communication services do not provide a guarantee for access to SES communication infrastructure at a specified quality.

We recommend that national policy makers carefully analyse the national markets for communication services and conclude whether communication services will be available to all household consumers that are, or will become part of the SES. If no minimum guarantee (e.g. based on the data communication services (functional internet access) requirement of Directive 2002/21/EG) for the provision of communication services suitable for SES communications exists, we suggest that the minimum quality standards for internet services could be aligned with the minimum standards for SES communications. Alternatively, the smart meter communication infrastructure could be used to integrate SES communication services. Either way, gua-

rantees that the universal service conditions for household consumers can be maintained in SES should be provided.

Additionally, EU policy makers should address household consumers’ access conditions for SES. EU law requires electricity supply at universal service conditions for household consumers and the rollout of smart meters. Moreover, large-scale implementation of SES is envisaged. This should also imply the provision of suitable communication services. However, EU law does not guarantee (or explicitly requires) that SES communication services will be available. Policy makers could consider adopting a safety net, setting minimum requirements for either the smart meter infrastructure, or perhaps data communication services. This would also service a broader policy objective enshrined in the Digital Agenda for Europe: ensuring (high quality) internet access throughout the EU.

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